

**Jean P. Shipman, MSLS, AHIP, FMLA; Sabrina Kurtz-Rossi, MEd;
Carla J. Funk, MLS, MBA, CAE, Hon FCLIP**

See end of article for authors' affiliations.

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Objectives: This research studied hospital administrators' and hospital-based health care providers' (collectively, the target group) perceived value of consumer health information resources and of librarians' roles in promoting health information literacy in their institutions.

Methods: A web-based needs survey was developed and administered to hospital administrators and health care providers. Multiple health information literacy curricula were developed. One was pilot-tested by nine hospital libraries in the United States and Canada. Quantitative and qualitative methods were used to evaluate the curriculum and its impact on the target group.

Results: A majority of survey respondents believed that providing consumer health information resources

was critically important to fulfilling their institutions' missions and that their hospitals could improve health information literacy by increasing awareness of its impact on patient care and by training staff to become more knowledgeable about health literacy barriers. The study showed that a librarian-taught health information literacy curriculum did raise awareness about the issue among the target group and increased both the use of National Library of Medicine consumer health resources and referrals to librarians for health information literacy support.

Conclusions: It is hoped that many hospital administrators and health care providers will take the health information literacy curricula and recognize that librarians can educate about the topic and that providers will use related consumer health services and resources.

INTRODUCTION

According to the Institute of Medicine (IOM) in its 2004 seminal report, *Health Literacy: A Prescription to End Confusion* [1], nearly half of the adult population in the United States has difficulty accessing health information and services. The IOM recognized that multiple factors contribute to the problem, including the complexity of the health care system and cultural and language barriers. To address these problems, the US Department of Health and Human Services (DHHS) in its *Healthy People 2010* document emphasized increasing the health literacy skills of the nation as a public health priority. Both reports define health literacy as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" [2]. The US Department of Education's National Center for Education Statistics published the first assessment of health literacy in the United States in 2006, *The Health Literacy of America's Adults: Results from the 2003 National Assessment of Adult Literacy* [3]. The study found that over a third (36%) of adults in the United States have basic or below basic health literacy skills.

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This article has been approved for the Medical Library Association's Independent Reading Program <<http://www.mlanet.org/education/irp/>>.



Supplemental Appendixes A, B, and C are available with the online version of this journal.

Highlights

- Health care providers responded positively to a health information literacy curriculum offered by librarians and to related resources and services, namely MedlinePlus and the information referral system known as Information Rx.
- Participation in a curriculum increased health care providers' knowledge of health information literacy, awareness of available consumer health information, and referral of patients to the library for additional assistance.
- Librarian involvement in health information literacy increased the profession's visibility and perceived value.

Implications

- Consumer health information services and resources offered by librarians can improve the health information literacy skills of health care providers and their patients.
- Training by librarians can increase knowledge of the importance of health information literacy and usage of MedlinePlus and Information Rx.
- Hospital-based administrators and health care providers can be champions in support of health information literacy and consumer health information services offered by libraries.

In 2007, the Joint Commission [4] and the American Medical Association (AMA) [5] published monographs describing the challenges those with poor health literacy and limited English proficiency (LEP) face when it comes to understanding and following health care instructions and the potential for adverse health outcomes and communication-related adverse events (i.e., injury or harm to patients). The Joint Commission noted that, "healthcare cannot assure patient safety without addressing negative aspects of low health literacy and ineffective communication" [4].

A review of the scientific literature by the Agency for Healthcare Research and Quality (AHRQ) [6] concluded that patients with low health literacy are less knowledgeable about their health conditions, are less likely to use preventive health care services, and are more likely to be hospitalized. An extensive recent review of the medical literature indicated that improved health literacy might help patients successfully manage their diseases, specifically their compliance with medication regimens [7]. More articles are being published in the literature on health literacy than ever before. A search of the US National Library of Medicine's (NLM's) PubMed database using "health literacy" as the search term showed an increase of 2900% in published articles on the topic from 1998 to 2008 (search conducted 1/19/09 using strategy: "health literacy [TI] AND YYYY [DP]"; 1998 had 3 articles published in that year; 2008 had 90).

BACKGROUND

In 2003, the Medical Library Association (MLA) formed the Health Information Literacy (HIL) Task Force to assist the association in addressing health information literacy issues [8]. The task force considered the DHHS definition of health literacy and the American Library Association's (ALA's) definition of information literacy to develop MLA's definition of "health information literacy" as "the set of abilities needed to recognize a health information need, identify likely information sources and use them to retrieve relevant information, assess the quality of the information and its applicability to a specific situation, and analyze, understand, and use the information to make good health decisions." The work of the task force was pivotal in moving MLA forward [9]. MLA's membership survey (n=315) conducted in winter 2005 found that 27% of responding members provided health information literacy services and 73% were interested in learning more about the topic. In 2006, a key priority of MLA President Jean P. Shipman, AHIP, FMLA, was to expand MLA members' roles in supporting health information literacy by encouraging them to deliver consumer health information as a means of addressing health literacy needs. She focused on the value that health information adds in terms of improving patient outcomes, safety, and satisfaction and emphasized that librarians should be recognized as key partners in advancing health literacy in their institutions.

PROJECT DESCRIPTION

From 2006 to 2008, MLA, through a contract with NLM, conducted a HIL Research Project. This contract continued MLA's work in this important area [10]. The overall goals of the HIL Research Project were to increase health care providers' knowledge of health literacy issues, identify roles medical librarians can play in addressing these issues, and increase provider and patient awareness and use of NLM consumer health information tools (e.g., MedlinePlus, NLM's consumer health information website [11], and Information Rx, a prescription-like referral slip for recommending MedlinePlus to patients [12]). In addition to surveying hospital-based administrators' and health care providers' awareness of health information literacy and promoting medical libraries' and librarians' roles in supporting health information literacy efforts, the project developed a multi-format curriculum to be used by librarians who are interested in providing consumer health information resources and services to raise awareness of health literacy in their institutions and by health care providers to learn about health literacy and available health information resources and services.

The project studied three main hypotheses and a sub-hypothesis including: (1) a majority of health care professionals, including hospital administrators, are not aware of NLM's consumer resources or other quality health information resources that are available to them; (2) a multi-format health information literacy curriculum taught by librarians can raise awareness of health literacy as an important public health issue among first-line health care providers; and (3) use of the NLM Information Rxs by health care providers to refer patients and families to MedlinePlus and hospital-based librarians can be increased through education. The sub-hypothesis was that hospital administrators favor funding consumer health information resource centers over hospital libraries targeted for health care providers.

METHODS

Survey

In Summer 2007, TAP Consulting was commissioned to design and conduct a national survey of hospital administrators and hospital-based health care providers to determine the target group's:

- perceived value of consumer health information resources and services and the librarians who provide them
- knowledge of quality NLM, MLA, and other consumer health information resources
- understanding and awareness of patient health information literacy needs
- attitudes toward funding a consumer health library over a traditional health provider library in their institutions

In addition to addressing these questions, the survey also was designed to inform the project team,

consisting of the project coordinator and two coprincipal investigators, as to what content should be included in the HIL Curriculum.

In fall 2007, a web-based survey was distributed to 7,655 senior hospital administrators (chief executive officer [CEO] or executive director level) and health care providers employed in hospitals. The target group sample was taken from the American Hospital Association (AHA) membership mailing list database. Email distributions of the survey were sent in September, followed by a second distribution that specifically targeted hospital administrators in October. In addition, a snowballing sampling method was used by MLA, in cooperation with the National Network of Libraries of Medicine (NN/LM), whereby the survey was passed through hospital librarians, who then personally contacted their administrators and health care providers. A copy of the survey is available online (Appendix A, online).

A total of 301 completed surveys (4% of those distributed) were received from 4 respondent groups: administrators (30%, $n=91$) and health care providers (51%, $n=154$) employed by hospitals with a library, and administrators (9%, $n=27$) and health care providers (10%, $n=29$) employed by hospitals without a library. The responses were representative of the national population in terms of hospital type, service area, and size with the following exceptions: (1) a larger percentage of the respondents were from hospitals with libraries than those without, and (2) the study sampled more heavily from medium-sized hospitals and academic medical centers. There was no pattern to suggest that the sample was biased in any other way.

Curriculum development and evaluation

A curriculum <<http://www.mlanet.org/resources/healthlit/>> was designed to be taught by librarians to health care providers (e.g., physicians, nurses, health educators, and others). An initial curriculum concept paper was developed by the project team and reviewed by members of the MLA Continuing Education Committee, MLA Hospital Libraries Section, and MLA Consumer and Patient Health Information Section. A broader community of librarians including representatives from NN/LM, project advisors, and NLM advisors and evaluators reviewed a first draft of the developed curriculum.

To test the curriculum, nine hospital library pilot sites from the United States and Canada were selected from a pool of twenty-three applicants by a committee composed of MLA and NN/LM representatives. Sites were chosen based on how applicants addressed the selection criteria and on how well they demonstrated their ability to meet pilot site expectations, including a commitment by their institutions to support consumer health information services and resources after the pilot ended. All had never offered consumer health information resources and services prior to applying to serve as a pilot site. The sites included libraries in academic and nonacademic hospitals, varied in size

and service area, and were located in both urban and rural settings. Table 1 provides a listing of the selected libraries.

The pilot used both quantitative and qualitative methods to evaluate the curriculum. Qualitative feedback was collected directly from pilot site librarians via a working conference, an evaluation webinar, and pilot site summary reports. Quantitative data were collected directly from curriculum participants via pre-/post-session evaluations and a two-month follow-up assessment with participants. The key outcomes and indicators identified in the original evaluation proposal are listed below:

1. Training participants will report an immediate increase in awareness of NLM consumer resources such as MedlinePlus and Information Rx, and their use of these resources will increase by 20% over a 2-month period of time.
2. Training participants will report an immediate increase in health literacy knowledge, and their intention to act (i.e., refer patients to MedlinePlus or the hospital librarian for support) will increase by 20% over a 2-month period of time.
3. Training participants will utilize Information Rx and patient referrals to MedlinePlus or the hospital librarian for support by an increase of 20% over a 6-month period.

Selected sites were expected to identify at least one librarian to pilot the curriculum and provide curriculum feedback; conduct three to five, one-hour curriculum sessions with a minimum of a total of thirty-five to fifty health care providers; use the curriculum to introduce health care providers to health information literacy challenges; support and encourage participants to use Information Rx to refer patients to MedlinePlus and to the hospital library for assistance; administer pre-/post-session evaluations and distribute a follow-up email assessment to participants two months after presenting the curriculum; plan and implement long-term delivery of consumer health information services, including Information Rx referrals; document post-session patient and provider use of library-supported consumer health information services, including the number of patients who came to the library with an Information Rx referral; provide curriculum feedback; and participate in a curriculum evaluation webinar. An archive of the webinar is available at <https://webmeeting.nih.gov/p82723452/>.

Pilot site librarians were also required to attend a two-day working conference on April 3–4, 2008, sponsored by the Indiana University School of Library and Information Science to review and evaluate the developed curriculum and prepare them to use it with health care providers and administrators in their institutions. Meeting participants included a small group of health care providers and administrators. A series of conference calls, a project blog, and email discussion list supported pilot site librarians throughout the pilot phase.

Pilot site librarians conducted training sessions and distributed the thirteen-question pre-/post-session

Table 1
Health Information Literacy (HIL) Research Project pilot site libraries and librarians

■ Berkshire Medical Center Health Sciences Library, Pittsfield, Massachusetts; Martha Prescott, AHIP, library director: Berkshire Medical Center is located in western Massachusetts serving rural residents in the Berkshire Hills and communities in adjacent eastern New York, northwest Connecticut, and southwest Vermont.
■ Billings Clinic Medical Library, Billings, Montana; Victoria Koch, AHIP, medical librarian, and Kim Hart, AHIP, medical librarian: Billings Clinic is a community-governed entity with a structure similar to the Mayo Clinic. Its service area includes rural communities in eastern Montana and northern Wyoming.
■ Good Samaritan Hospital Health Sciences Library, Los Angeles, California; Andrea Harrow, medical librarian: Good Samaritan Hospital serves the Los Angeles metropolitan area. The diversity of the community is reflected in the hospital staff, who speak more than sixty languages.
■ Lake Hospital System Medical Library, Painesville, Ohio; Holly Sheldon Kimborowicz, AHIP, health sciences librarian: The primary service area for this hospital is Lake County, Ohio, just east of Cleveland/Cuyahoga County. Lake Hospital System also serves eastern Lake County and western Ashtabula County.
■ Regina Qu'Appelle Health Region, Regina General Hospital Health Sciences Library, Regina, Saskatchewan, Canada; Jeff Mason, medical librarian, and Mary Chipanshi, AHIP, medical librarian: The Regina Qu'Appelle Health Region is the largest health care delivery system in southern Saskatchewan, serving residents living in 120 cities and towns, and 17 First Nation communities.
■ St. Joseph Hospital Burlew Library, Orange, California; Julie Smith, AHIP, library manager: The St. Joseph Hospital service area extends throughout Orange County in southern California. Orange County is the third most populous county in California with a significant Spanish-speaking population (41.3%).
■ St. Vincent Hospital Library, Indianapolis, Indiana; Carolyn Martin, AHIP, medical librarian, and Denise Rumschlag, AHIP, manager, Library Services: St. Vincent Hospital is the largest health care system in Indiana and serves not only Indianapolis, but also the entire central Indiana area made up of forty-five counties.
■ Stormont-Vail Healthcare Stauffer Health Sciences Library, Topeka, Kansas; Lenora Kinzie, director, Library Services, and Scarlett Fisher-Herremann, librarian, Topeka & Shawnee County Public Library: Stormont-Vail HealthCare serves a twelve-county area of northeast Kansas. The public library is located directly across the street from Stormont-Vail and serves a similar clientele.
■ University of South Alabama, Mobile, Alabama; Beverly Rossini, outreach/information resources librarian, and Geneva Bush Staggs, AHIP, assistant director for hospital services: The University of South Alabama Medical Center is an academic hospital located in Mobile, Alabama, and serves south Alabama and the northern Gulf Coast.

evaluation (Appendix B, online) to all HIL Curriculum participants between April and July 2008. Participants completed questions one through five before the session began, which measured if they were familiar with health literacy, consumer health information resources, and Information Rxs as well as if they had ever referred their patients to their institutions' hospital libraries. Questions six through thirteen were completed immediately after the training session finished. These post-training questions addressed training participants' perceived behavior changes affected by the training, as well as what parts of the training were most effective. The evaluation results were entered into SurveyMonkey, and a summary report of descriptive data was generated.

The six-item follow-up assessment (Appendix C, online) was emailed to the curriculum participants who had agreed to be contacted two months after attending the curriculum session. Recipients were given multiple options for responding: web-based tool (SurveyMonkey), email return, or hard copy return, with responses manually entered into SurveyMonkey. A summary report of these data was generated.

Pilot librarians submitted Information Rx monthly tracking reports from April to August 2008, participated in the evaluation webinar, and submitted a one-time pilot summary report in early September 2008. Using data analysis methods described by Olney and Barnes [13], qualitative data collected via the evaluation webinar and summary reports were organized into five response categories: successes, challenges, unexpected outcomes, suggestions for improvement, and lessons learned. In each category, clusters of similar responses were grouped and identified as themes.

RESULTS

Survey

The findings and results of the perceived value survey are numerous and are reported in full on the

MLANET project site [14]. Key results, based on adjusted percentages that reflect the magnitude of responses in terms of people who answered the questions, versus the overall sample, are provided below.

Information resources. A majority (82%, $n=221$) of respondents felt that the provision of consumer health information resources was critically important to fulfilling the institution's mission in that it increases patient satisfaction (92%, $n=248$), improves patient-provider communication (92%, $n=243$), increases patient decision-making participation (92%, $n=240$), improves health outcomes (91%, $n=248$), increases service quality (91%, $n=245$), decreases patient anxiety (86%, $n=227$), increases treatment compliance (78%, $n=206$), and decreases medical errors (69%, $n=182$).

Funding priorities. When forced to choose between funding libraries that solely supported health care providers versus patients, 86% ($n=164$) chose to fund a traditional health care provider library. All (100%, $n=116$) of the providers who responded chose the traditional provider library as they felt providers used these resources and services to provide health information to their patients. Of the administrator group, 65% ($n=48$) chose funding the traditional provider library. However, in response to an open-ended question that asked respondents why they chose one library type over the other, a majority said they would have preferred to fund both types of libraries as they saw the value in both consumer and provider libraries.

Awareness and use. There appeared to be a general awareness of online consumer health information among administrators and health care providers, with 49% ($n=117$) responding that it was critically important for hospitals to provide patients with access to Internet-based health resources and services. Regard-

ing referrals, 52% of the providers (n=67) indicated that they would refer patients specifically to MedlinePlus in the future. However, only 25% (n=59) were aware of Information Rx or similar tools that assist providers in referring patients to quality health information resources, and only 16% (n=24) reported ever having actually used an information prescription. When asked what would increase this tool's usage, 63% (n=90) stated free Internet access for patients and 52% (n=96) said assistance for patients looking for Internet-based health information.

Health literacy. Nearly all respondents felt that their hospitals could improve health information literacy by increasing awareness about its impact on patient care (95%, n=212) and by training staff to become more knowledgeable about health literacy barriers (91%, n=202). Over 94% (n=189) thought that offering consumer health information resources and services would improve health information literacy.

Curriculum: quantitative results

From April to July 2008, pilot site librarians conducted 67 curriculum sessions and reached 1,114 health care providers, including administrators (5%), nurses (38%), pharmacists (4%), physicians (15%), and others (39%, representing residents, social workers, physical therapists, etc.). This was almost double the original projection of 35 curriculum sessions and more than triple the number of health care providers targeted (n=350). Of those who completed the pre-/post-session evaluation, 384 (42%) agreed to follow-up contact. A total of 183 follow-up surveys were returned.

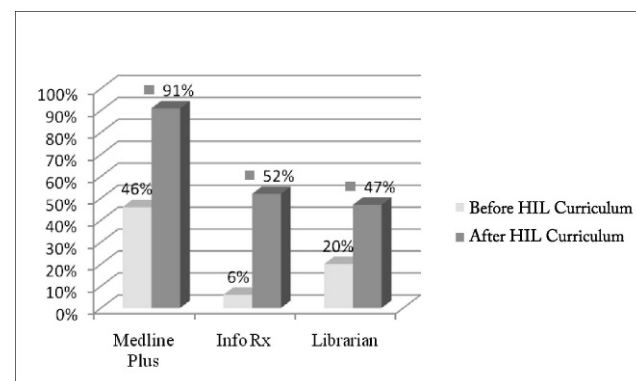
Pre-/post-session evaluation. A total of 912 (82%) pre-/post-session evaluations were returned. Among those responding to the question on the pre-/post-session evaluation, 43% identified themselves as nurses (n=364), representing the largest health care professional type. Fifteen percent identified themselves as physicians (n=127). Other participants included allied health professionals, health educators, hospital administrators, occupational therapists, pharmacists, physical therapists, and social workers.

Among those responding to the question, 46% of participants (n=389) said they had used MedlinePlus on the pre-session evaluation, while 91% (n=776) said they intended to use MedlinePlus on the post-session evaluation, indicating an almost 100% increase in the number of health care providers who will use MedlinePlus as a result of participating in the curriculum (Figure 1). The HIL Curriculum far exceeded its target measure of 20% more health care providers becoming aware of NLM resources and intending to use MedlinePlus.

Only 6% of participants (n=48) responding to the question said they had used the patient education tool Information Rx to refer patients to health information on the pre-session evaluation, while 52% (n=449) said they intended to use the Information Rx tool on the

Figure 1

Respondents' reported and intended use of MedlinePlus, Information Rx, and librarian consumer health information services before and after participation in the MLA Health Information Literacy (HIL) Curriculum*



* Intended use includes all respondents who indicated they were likely or very likely to use these resources immediately after participating in the curriculum. Total number of respondents (n) for the 3 questions: MedlinePlus: n=860; Information Rx: n=869; librarian: n=878.

post-session evaluation (Figure 1). This finding indicates that about 8 times as many health care providers may use the Information Rx pad after participating in the curriculum, exceeding the target measure of a 20% increase in the use of Information Rx.

Twenty percent of participants responding to the question (n=175) said they had referred patients to their hospital librarians on the pre-session evaluation, while 47% (n=411) said they intended (likely or very likely) to refer patients to the librarian on the post-session evaluation (Figure 1). If participants follow through with their intentions, the number of health care providers referring patients to hospital librarians will increase 78%. These data indicate that the HIL Curriculum exceeded its target of 20% more health care providers intending to refer patients to their hospital librarian.

A majority (86%) of the participants responding to the question (n=625) agreed or strongly agreed that the curriculum increased their knowledge of health literacy and its impact on patient care (Table 2). These data indicate that the curriculum achieved its goal of increasing knowledge of health literacy issues among health care providers.

Follow-up assessment. Among those who completed the follow-up assessment (n=161), 34% of those responding to the questions identified themselves as nurses (n=55) and 11% identified themselves as physicians (n=18). Other respondents included allied health professionals, health educators, hospital administrators, occupational therapists, pharmacists, physical therapists, and social workers.

Sixty percent of respondents responding to the question (n=99) said they had used MedlinePlus since participating in the HIL Curriculum. Twenty percent of respondents responding to the question (n=31) said they had used the Information Rx pads to

Table 2

Increase in health literacy knowledge as a result of participating in the HIL Curriculum

	Strongly agree/agree	Neither agree nor disagree	Disagree/strongly disagree
This training increased my knowledge of health literacy and its impact on patient care	86% (n=625)	10% (n=73)	4% (n=28)
Answered question		n=726*	
Skipped question		n=37	

* Two of the 9 pilot sites omitted this question from their post-session evaluation, resulting in the lower number (726) for this item. The omission was due to a miscommunication.

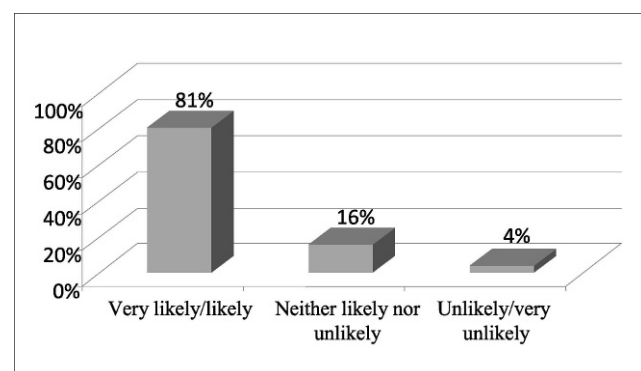
refer patients to Internet-based consumer health information, and 26% percent (n=41) said they had referred patients to their librarians for resources and support since participating in the HIL Curriculum. Most who said they had referred patients indicated in the follow-up question, "How many patients did you refer?", that they had referred more than 1 patient. Based on self-report, health care providers used Information Rx to refer a total of 127 patients to Internet-based consumer health information and 118 to librarians for resources and services as an outcome of participation in the HIL Curriculum. The most common reasons stated among those who did not use the Information Rx pads to the follow-up question, "Why not?", were: do not have direct patient contact, did not remember about the pads, lost the pads, or simply did not have the pads when needed. A strong majority (81%) of respondents responding to the question (n=128) said they were likely or very likely to seek assistance from their librarians and use librarian-supported health information literacy services (Figure 2). This finding suggests that the HIL Curriculum achieved its goal of promoting the role of librarians as key providers of health information literacy resources and support.

Curriculum: qualitative results

The qualitative feedback collected from the pilot site librarians helped identify successes, challenges, suggested changes, unexpected outcomes, and lessons learned.

Figure 2

Use of librarian supported health literacy services as a result of participating in the HIL Curriculum (n=159)



Successes. Pilot site librarians described the benefits associated with implementing the HIL Curriculum. Many of them commented on how the curriculum helped raise awareness of health literacy in their hospitals and of the role of the librarian in providing health literacy resources and services. Increasing the visibility of the library in the institution was also seen as a benefit of implementing the curriculum. Implementation of Information Rx was seen as both a success and a challenge. Many providers, while behind the concept in theory, found that they forgot to issue the Information Rx's during patient visits. Several marketing departments were also concerned that the Information Rx's be branded with the institution name.

Challenges. Pilot site librarians faced a number of challenges in implementing the HIL Curriculum. Challenges included limited time slots available for presenting the curriculum, trouble with the audiovisual aspects of the curriculum, and inability to encourage Information Rx referrals to the library.

Suggested changes. Pilot site librarians offered a number of suggestions for improvement including creating a shorter, thirty-minute version of the curriculum and providing less background, such as various national studies' statistical data, in favor of more information about what health care providers can do to promote health literacy.

Unexpected outcomes. A number of sites experienced unexpected outcomes as a result of participating in the pilot. In one case, implementation of the curriculum "saved part of the library," commented one hospital librarian. She relayed this story: "One of the vice presidents planned to take half of the library to make an office for two secretaries. I enlisted the support of our CEO citing our participation in the health information literacy project and our planned expansion of consumer health information services. The result was that the facilities department was told not to touch the library!" In another case, the library was recognized as a key player in hospital patient safety per this story: "The insurer had asked about health literacy as a patient safety issue and staff reported that the library had been presenting on the topic and have these Information Rx pads so patients can go to the library for help. The insurance representative met with the health science librarian

to learn more, and thought it was a tremendous program."

Lessons learned. Pilot site librarians offered the following advice to librarians interested in implementing the curriculum in the future. "I would recommend practicing with the equipment in the space where you are going to present before doing your program," advised several pilot librarians. Others saw great value in having a hospital administrator and health care provider champion their program. On a somewhat related note, pilot site librarians recommended talking to all hospital departments, especially the marketing department, before implementing the curriculum and Information Rx. And finally, "Give it time. Many departments in hospitals are overwhelmed with all the things they are dealing with, and you need to approach them in a manner that shows how the library can help."

LIMITS OF THE STUDY

Methodological limitations must be considered. Various surveys were employed throughout the implementation of the project. First, there was the survey of hospital administrators and health care providers. This survey was completely voluntary, and no incentives were offered other than a free subscription to *NIH MedlinePlus Magazine*. It was possible that those who did respond might hold a bias favoring the topic of inquiry. In addition, while it may have increased the response numbers, the snowballing sampling method made it difficult to determine a true response rate.

In terms of the pre/post-session evaluations administered to participants of the curriculum, this survey had a very strong response rate of 82%, which provided some degree of confidence that non-response bias was minimal. While participants were encouraged to be honest and told that their responses were anonymous, it must be recognized that the data were self-reported.

While the respondents' professions might affect their willingness to participate in a follow-up study, in this project, the profession percentages varied less than 2%. Among the actual respondents, no profession was strongly under- or over-represented. The percentages of each profession type were within 10 percentage points of the total participant demographics.

DISCUSSION

Of all the survey findings, the greatest surprise was that hospital-based administrators and health care providers favored funding library services for health care providers over library services for patients, when a choice was forced. This finding was contrary to the researchers' original sub-hypothesis that hospital administrators would favor funding consumer health information resource centers over hospital libraries targeted for health care providers. However, the

open-ended question asking why revealed that respondents would prefer to fund both if enough funding was available.

Pilot site librarians conducted double the number of curriculum sessions than originally planned and trained more than four times the target number of health care providers. This high level of pilot testing activity coupled with the survey finding that hospital-based administrators and health care providers value consumer health information services in addition to library services for health care providers supports the need for librarians' continued engagement in offering consumer health and health information literacy services. Via structured formative feedback, pilot site librarians also reported that their local administrators and health care providers supported them and that these internal "champions" were vital to the success of their efforts and should be enlisted by other librarians interested in pursuing such roles.

Also of note was that a majority of participants (86%, $n=625$, Table 2) reported in the post-session evaluations that the HIL Curriculum increased their knowledge of health literacy and its impact on patient care. The number of health care providers stating that they would use resources such as MedlinePlus and their librarians as a result of their training increased more than 100%. This finding supports the study's hypothesis that librarians can play an important role in their hospitals in terms of raising awareness of the impact low health literacy has on patient care.

CURRICULUM

Based on input from the pilot site librarians, a shorter twenty-to-thirty-minute version of the curriculum has been developed, in addition to the forty-to-fifty-minute version, in consideration of the time constraints of busy health professionals. Many institutions that realize the value of health literacy, and especially its relationship to cultural competency, are seeking cost-effective ways of educating their providers. To fulfill that need, MLA also commissioned the creation of a web-based, self-guided tutorial. This one-hour tutorial can be taken in stages as time permits by any health care professional. Individuals completing the online course obtain a certificate that can then be used to receive relevant continuing education credit. The HIL Curriculum is available on MLANET [15].

The positive results demonstrated by the HIL Research Project and the strong interest in health literacy among the health care community and medical librarians calls for continued engagement by MLA and NLM in supporting and expanding health information literacy initiatives for and by librarians. Further research is needed to quantify and develop means for overcoming barriers to increased usage of available consumer health information resources and services in addition to recognition of factors that affect budgetary decisions. Project results indicate that hospital administrators and health care providers value consumer health infor-

mation for improved patient outcomes and the role librarians play in enhancing and improving their institutions' effectiveness in patient care. These values need to be converted into practice.

CONCLUSIONS

The HIL Research Project successfully surveyed hospital administrators and health care providers concerning attitudes about consumer health information and used the resulting data in developing and evaluating a curriculum taught by librarians that increased awareness of health literacy issues, encouraged use of NLM consumer resources and tools such as MedlinePlus and Information Rx by health care providers and their patients, and promoted the role of librarians as key providers of consumer health information resources and services. Implementation and evaluation of the curriculum by nine pilot site librarians resulted in the collection of both quantitative and qualitative data that supported key HIL Research Project hypotheses: (1) health care providers are generally not aware of NLM consumer resources such as MedlinePlus, and formal training on health information literacy can inform providers of these resources; (2) a health information literacy curriculum taught by librarians can raise awareness among health care providers of the impact low health literacy has on quality care and the role librarians can play in improving provider awareness of this issue; and (3) education and support can increase use of Information Rx by health care providers to refer patients to MedlinePlus and to their hospital librarians for help.

FUTURE

It is hoped that many health care professionals will make use of the online tutorial and the librarian-mediated curricula to educate themselves and others about health literacy and the multitude of information resources available to them as well as to their patients. It is also hoped that through these instructional toolkits, medical librarians' roles as educators in this important subject and their many contributions in support of promoting health information literacy will continue to be valued and appreciated.

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REFERENCES

1. Institute of Medicine. Health literacy: a prescription to end confusion [Internet]. Washington, DC: The National Academies Press; 2004 [cited 1 Feb 2009]. <<http://www.iom.edu/CMS/3775/3827/19723.aspx>>.
2. US Department of Health and Human Services. Healthy people 2010 [Internet]. Washington, DC: US Government Printing Office; 2000 [cited 1 Feb 2009]. <<http://www.healthypeople.gov/Document/pdf/uih/2010uih.pdf>>.
3. US Department of Education's National Center for Education Statistics. The health literacy of America's adults: results from the 2003 national assessment of adult literacy, NCES 2006-483 [Internet]. The Department [cited 1 Feb 2009]. <<http://www.nces.ed.gov/pubs2006/2006483.pdf>>.
4. The Joint Commission. "What did the doctor say?": improving health literacy to protect patient safety [Internet]. The Commission; 7 Feb 2007 [cited 1 Feb 2009]. <http://www.jointcommission.org/NR/rdonlyres/D5248B2E-E7E6-4121-8874-99C7B4888301/0/improving_health_literacy.pdf>.
5. American Medical Association. Health literacy and patient safety: help patients understand [Internet]. Chicago, IL: AMA Press; 2007 [cited 17 Jun 2009]. <<http://www.ama-assn.org/ama1/pub/upload/mm/367/healthlitclinicians.pdf>>.
6. Agency for Healthcare Research and Quality. Literacy and health outcomes. evidence report/technology assessment. number 87 [Internet]. Rockville, MD: The Agency; 2004 [cited 1 Feb 2009]. <<http://www.ahrq.gov/downloads/pub/evidence/pdf/literacy/literacy.pdf>>.
7. Keller DL, Wright J, Pace HA. Impact of health literacy on health outcomes in ambulatory care patients: a systematic review. *Ann Pharmacother*. 2008 Sep;42(9):1272-81. Epub 2008 Jul 22. DOI: 10.1345/aph.1L093.
8. Rambo N. Exploring health information literacy. *MLA News*. 2004 Feb;363:11.
9. Medical Library Association. Health information literacy task force final report [Internet]. The Association [cited 1 Feb 2009]. <http://www.mlanet.org/pdf/resources/hil_final_20050420.pdf>.
10. Medical Library Association. Health information literacy research project [Internet]. The Association [cited 1 Feb 2009]. <http://www.mlanet.org/resources/healthlit/hil_project.html>.
11. National Library of Medicine and the National Institutes of Health. MedlinePlus [Internet]. The Library and Institutes [cited 12 Apr 2009]. <<http://www.medlineplus.gov>>.
12. Siegel ER, Logan RA, Harnsberger RL, Cravedi K, Krause JA, Lyon B, Hajarian K, Uhl J, Ruffin A, Lindberg DA. Information Rx: evaluation of a new informatics tool for physicians, patients, and libraries. *Inf Serv Use*. 2006;26(1):1-10. Epub PMID: PMC1610110.
13. Olney CA, Barnes S. Planning and evaluating health information outreach projects, booklet 3: collecting and analyzing evaluation data. Seattle, WA: National Network of Libraries of Medicine, Pacific Northwest Region; 2006.
14. Medical Library Association. Health information literacy: MLA health information literacy research project. consumer health information summary report [Internet]. The Association 11 Feb 2008 [cited 12 Apr 2009]. <http://www.mlanet.org/resources/healthlit/hil_project.html>.

15. Medical Library Association. Health information literacy: MLA health information literacy research project. health information literacy curriculum and support tools [Internet]. The Association [cited 12 Apr 2009]. <<http://www.mlanet.org/resources/healthlit/>>.

AUTHORS' AFFILIATIONS

Jean P. Shipman, MSLS, AHIP, FMLA (corresponding author), jean.shipman@utah.edu, Director, Spencer S. Eccles Health Sciences Library, Univer-

sity of Utah, 10 North 1900 East, Building 589, Salt Lake City, UT, 84121; **Sabrina Kurtz-Rossi, MEd**, sabrina_kurtz-rossi@comcast.net, Principal, Kurtz-Rossi & Associates, and Coordinator, Health Information Literacy Research Project, 122 Woburn Street, Medford, MA, 02155; **Carla J. Funk, MLS, MBA, CAE, Hon FCLIP**, funk@mlahq.org, Executive Director, Medical Library Association, 65 East Wacker Place, Suite 1900, Chicago, IL, 60601-7246

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